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The LARGER CORN STALK-BORER



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MANY A FINE field of corn in the South Atlantic States is broken down by heavy winds during the later growing season because the stalks had been weakened by insects boring into them. The damage is done by a pale, dark-spotted caterpillar, the larger corn stalk-borer.

Only corn is injured seriously by this insect; some of the larger grasses are its food plants, and sugarcane sometimes is damaged slightly. There are two generations in a season. As the second generation passes the winter in the corn roots, if the roots are destroyed or plowed out, the pest will be largely subdued. The injury is worst where corn follows corn, so rotation of crops will help to destroy the borer.

This bulletin gives the life history of the borer, its feeding habits, and methods of combating it.

THE LARGER CORN STALK-BORER¹

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IN MANY southern cornfields a heavy wind late in the season, before the corn is matured, does great damage by breaking the plants off at the surface of the ground. Usually these broken stems have been weakened by the burrows of a larva or caterpillar (fig. 1) known as the larger corn stalk-borer. Its work is largely within the stem of the plant and is so concealed that, in most cases, unless the stalk breaks, the presence of the insect is unnoticed.

This insect is very similar to the sugarcane borer (*Diatraea saccharalis* Fab.) occurring in the southern parts of Louisiana, Florida, and Texas and in the tropics, and for a long time was supposed to be the same. It has proved to be distinct, and probably is a native of the Atlantic States, from Alabama and northern Florida to Maryland, where it is now found. (Fig. 2.) Even in the southern part of this region, where cane is grown, the insect rarely attacks it, although the sugarcane borer feeds on corn and sugarcane indiscriminately. The corn stalk-borer has also been reported as feeding on sorghum, Johnson grass, guinea corn, and grama grass. The injury to plants other than corn is never severe, but when methods of control are being planned these plants should be examined to determine whether they are harboring the pest.

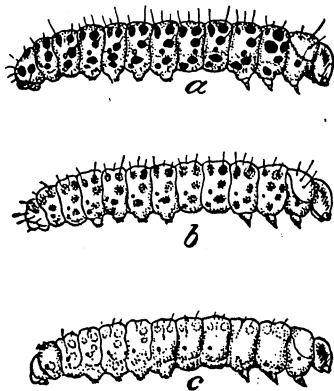


FIGURE 1.—The larger corn stalk-borer; a, Summer form of larva; b, c, hibernating forms of larvae. Enlarged. (Redrawn from Howard)

EXTENT AND NATURE OF DAMAGE

The insect most frequently injures corn in Georgia, South Carolina, North Carolina, and Virginia, but occasionally causes cornfields in the southern and eastern part of Maryland to be abandoned. Al-

¹ *Diatraea crambidoides* Grote; order Lepidoptera, family Pyralidae, subfamily Crambinae.

² Died Dec. 19, 1930. This revision was made by W. J. Phillips.

though it causes serious losses every year throughout many Southern States, farmers generally are so accustomed to it that they pay little attention unless fields are almost totally destroyed.

The first brood of larvae, if abundant, may almost entirely destroy whole fields, killing many plants outright, and stunting others so badly that they produce no grain. The larvae of the second generation frequently do as much damage as those of the first generation, particularly in corn on poor soil. The larval tunnels in late corn so weaken the stalks that any ordinary rain or windstorm causes the plants to break over before they are mature and therefore produce little or no grain.

The damage done by the first generation is almost exclusively in the "throat" of the plant until the worms are about half grown, feeding principally in the unfolding leaves and causing the characteristic "ragworm" or "budworm" injury.

If they injure the tender growing tip within the protecting leaves they destroy all chance that the plant will become normally productive. This feeding makes the characteristic irregular holes, arranged somewhat definitely in rows (fig. 3) across the blades. While several other insects similarly mutilate the leaf, this insect is responsible for much of the so-called budworm damage in many localities. The larvae may feed on the unfolded blades, making holes irregular in shape and arrangement. Small larvae, especially if there are several in one plant, may tunnel the midribs of the leaves.

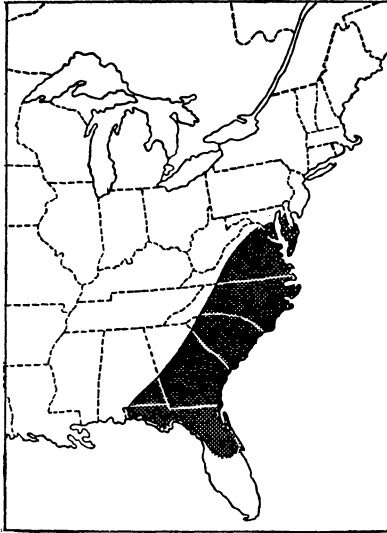


FIGURE 2.—Map with shaded area showing present known distribution of the larger corn stalk-borer

After the larvae are about half grown they crawl down the stalk and burrow into the lower joints, usually entering between the second and sixth joints above the ground. They tunnel up and down inside the stalk (fig. 4), doing injury that is seldom evident unless the infested stalks are broken by the wind. Entrance and emergence holes (fig. 5) are other evidences of this type of injury.

DESCRIPTIONS OF THE DIFFERENT FORMS OR STAGES

The four successive stages in the development of this insect are (1) the egg, (2) the larva, caterpillar, or borer, (3) the pupa, chrysalis, or resting stage, and (4) the adult, or moth.

THE EGG

The eggs are flat and scalelike, almost circular in outline, and placed in rows or irregularly, overlapping one another shingle fashion. From 2 to 25 are laid in one place on the underside of a

lower leaf, or occasionally on the upper side or on the stem. Creamy white when first laid, they change gradually to reddish brown.

THE LARVA

The larva of the first generation (fig. 1, *a*), when full grown, is a robust, dirty-white caterpillar 1 inch long, thickly covered with round or irregular dark spots, each bearing a short, dark bristle. When the larva is small, these markings almost touch one another, giving the whole insect a dark, hairy appearance. The head and neck



FIGURE 3.—Work of the larger corn stalk-borer, showing damage to the leaves by larvae of the first generation

shield of all stages are brownish yellow. The overwintering larva of the second generation (fig. 1, *b*, *c*) gradually loses the darker markings and after the last molt remains unspotted and light yellow, except for the head and neck shield, which retain the brownish-yellow color.

THE PUPA

When first formed, the pupa (fig. 6) is light honey yellow in color, soon changing to rich mahogany brown. It is about seven-eighths inch long.

THE ADULT, OR MOTH

The female moth (fig. 7) ranges in color from almost white to smoky yellow. The fore wings, which spread to about $1\frac{1}{4}$ inches, are darker than the hind wings, and bear faint markings. When at rest the wings are held close to the body, forming an acute triangle.

Egg-laying occurs, for the most part, either at night or in the dusk of evening.

HABITS OF THE LARVAE,
OR BORERS

Immediately upon leaving the egg in the spring, each young larva of the first generation, spinning a silken thread behind it, goes down into the throat of the plant as far as the moisture usually standing there will allow, and begins to feed, riddling the yet-unfolded clusters.

The larva soon leaves the more leafy portion of the plant and enters the stalk lower down, burrowing through the pith. When fully grown it cuts a circular hole in the outer wall of the stalk, spins a few loose threads across the opening, retreats a short distance, plugs the burrow below with digested pith, and in the chamber thus formed slowly changes to the resting stage, or pupa. (Fig. 6.)



FIGURE 4.—Work of the larva of the larger corn stalk-borer in a cornstalk. Enlarged

The larvae of the second generation work in a similar manner, except that when they appear the tassel has been formed and damage is confined to the lower stalk.

LIFE OF THE INSECT THROUGHOUT THE YEAR

During the early winter the insect is a robust, creamy-white larva in the lower part of the stalk, or, if the corn has been cut, in the stubble. Later in the season the larva penetrates to the root and spends the winter in a small cavity below the surface of the ground, well protected from birds, predatory insects, and unfavorable weather. From the time the corn is mature until about corn-planting time this caterpillar remains inactive. About the time the ground is being prepared for corn, from March 15 to April 30, depending

on the locality, this larva changes into a reddish-brown pupa, or chrysalis. After 10 or more days in this stage the pale yellowish-brown moth emerges from the pupal case. The moths mate and the females begin to deposit eggs on the underside of the leaves. The larvae hatching from these eggs form the first brood of the season.

The eggs hatch in from 7 to 10 days, and the larvae begin their destructive work. The period from egg to full-grown larva is from 20 to 30 days, depending on weather and the vigor of the plant. The full grown larvae pupate in the stalk, usually in the second or third joint from the ground, and in from 7 to 10 days the moths of the first generation emerge.

The eggs for the second generation are laid as are those for the first generation, but on the lower leaves or the stem of the corn, and the larvae, after feeding for a short time on the leaves, go directly to work in the stalk, completing their larval growth in the pith of the lower stalk as did the larvae of the first generation.

The larger corn stalk-borer passes the winter only in the form of the overwintering larva in the cavity in the extreme lower tip of the corn root. There is no evidence of more than two generations a year.

As many as 15 larvae are sometimes found in one stalk, but seldom do more than 2 or 3 of these reach the pupal stage. In the winter there is usually only a single larva in a root, although occasionally two are found, always in separate cavities.



FIGURE 5.—Work of the larvae of the second generation of the larger corn stalk-borer in old stalks. About natural size

HOW TO PREVENT DAMAGE

Rotation is one of the best general preventives of injury from insects affecting field crops. Where corn has followed corn upon

the same field for two or more years, the loss from the borer has been much greater than where an annual change has been made, especially if stalks or stubble from the previous crop have remained undisturbed throughout the winter.

The most effective defense against the larger corn stalk-borer is thoroughly to destroy all old corn stubble left in the field from the previous crop before the moths emerge in the spring. Disposing



FIGURE 6.—Pupa of first generation of the larger corn stalk-borer in injured stalk of corn. About natural size

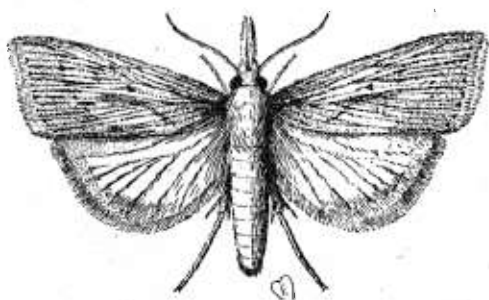


FIGURE 7.—Moth or adult of the larger corn stalk-borer. Twice natural size

of such refuse at the proper time will practically eradicate the insect. A few borers may survive in the roots of the larger grasses, so these roots should also be destroyed.

A simple and effective remedy in the more northern range of this insect is to plow the stubs out with a turning plow and then harrow the land once in order to remove the soil from the stubs and expose the larvae to the weather. Plowing too deep covers the stubs with too much soil, and they can not be sufficiently uncovered by one harrowing. On the other hand, too shallow plowing which cuts off the stubs at or near the surface of the ground will not expose the larvae sufficiently. This operation should be completed not later than December 10, and the stubs should be allowed to remain exposed until about March 1.

If corn is cut low and the land plowed deeply, so that the stubs are covered with about 2 inches of soil, the moths will be unable to emerge, and control should be very satisfactory.

Any method that insures complete destruction of the overwintering larvae, especially if undertaken simultaneously by all the farmers of a locality, will reduce the numbers of the insect and practically eliminate injury from it.